Cambridge Assessment International Education

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CANDIDATE NAME									
CENTRE NUMBER						CANDIDATE NUMBER			

BIOLOGY **0610/31**

Paper 3 Theory (Core) **May/June 2021**

1 hour 15 minutes

You must answer on the question paper.

No additional materials are needed.

INSTRUCTIONS

- Answer **all** questions.
- Use a black or dark blue pen. You may use an HB pencil for any diagrams or graphs.
- Write your name, centre number and candidate number in the boxes at the top of the page.
- Write your answer to each question in the space provided.
- Do **not** use an erasable pen or correction fluid.
- Do **not** write on any bar codes.
- You may use a calculator.
- You should show all your working and use appropriate units.

INFORMATION

- The total mark for this paper is 80.
- The number of marks for each question or part question is shown in brackets [ ].

This document has **20** pages. Any blank pages are indicated.

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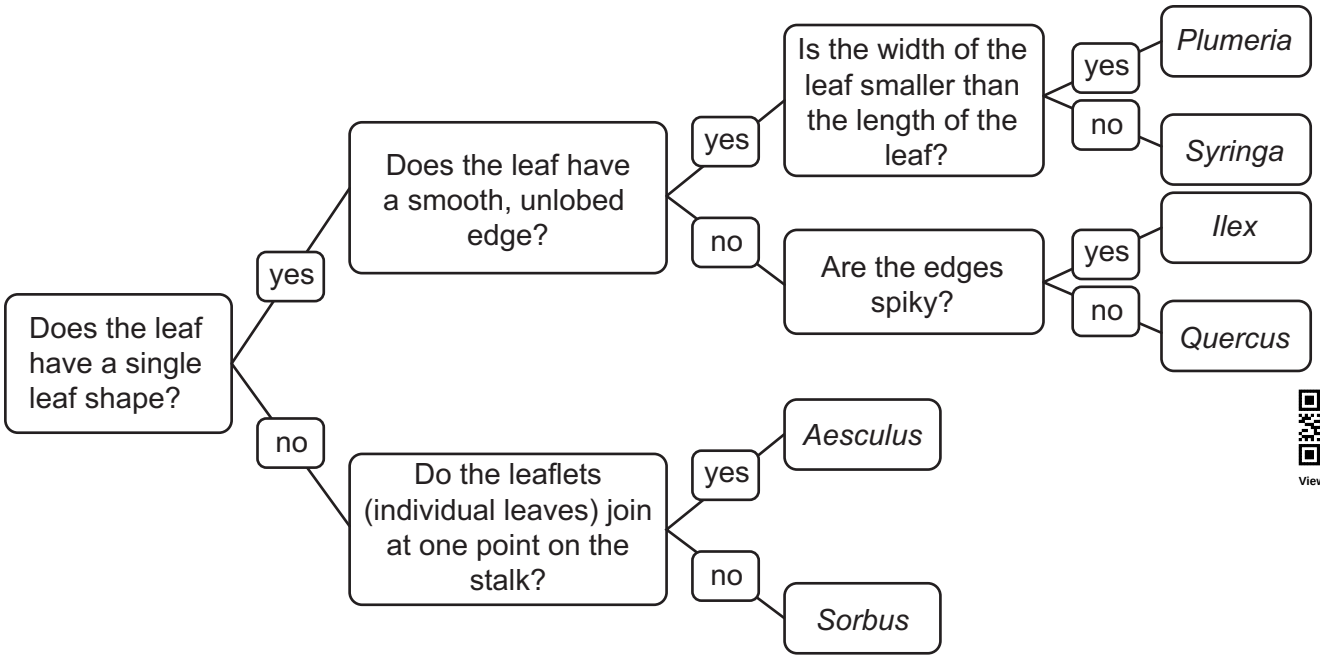
1 Fig. 1.1 is a dichotomous key. It can be used to identify different types of tree by using their leaves.



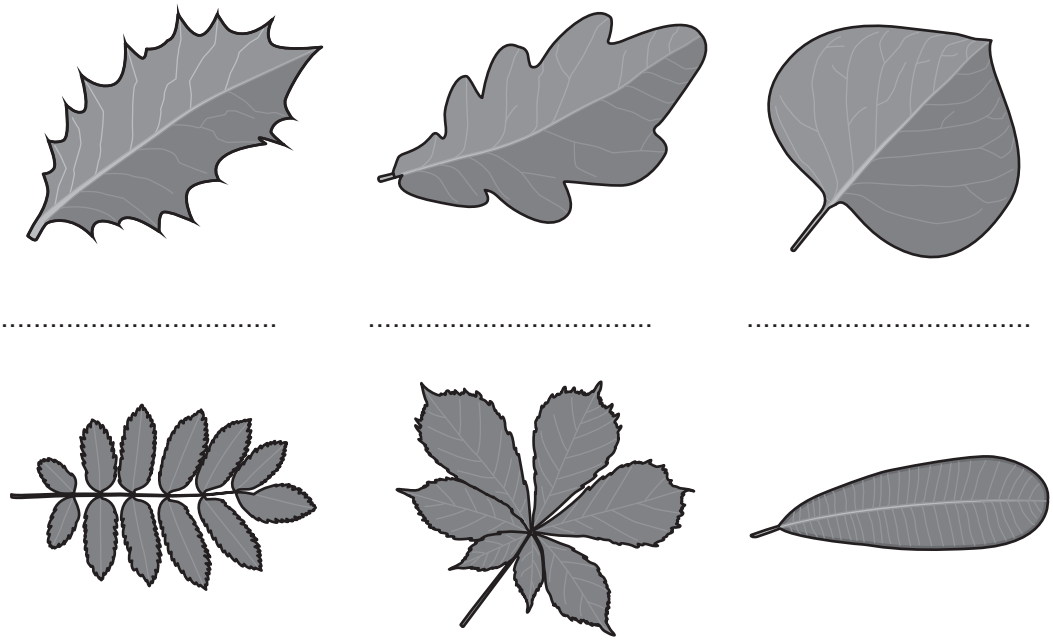
View solution

Fig. 1.1

Fig. 1.2 shows leaves from six different trees.

Use the key in Fig. 1.1 to identify the six different types of tree.

Write the name of each tree on the lines in Fig. 1.2.



....

....

Fig. 1.2

[5]

2 **(a)** Fig. 2.1 is a front view diagram of the male reproductive system in humans.

View solution

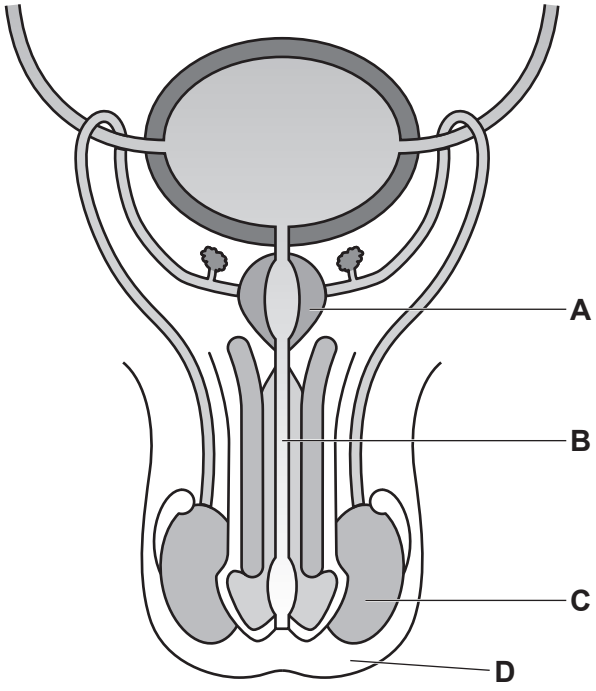


Fig. 2.1

The boxes on the left show the letters identifying the parts in Fig. 2.1.

The boxes on the right show the functions of some of the parts of the male reproductive system.

Draw lines to link each letter to its function. Draw **four** lines.

letter from Fig. 2.1	**function**
	gland that secretes fluid for sperm to swim in
A	
	produces sperm
B	
	sac that holds the testes
C	
	tube carrying semen and urine
D	
	tube carrying sperm to urethra

[4]

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(b) Sperm are the male gametes in humans.

View solution

(i) State the name of the female gamete in humans.

..... [1]

(ii) State the name of the cell that is formed at fertilisation.

View solution

..... [1]

(iii) State the usual site of fertilisation in humans.

View solution

..... [1]

(c) The human reproductive system is involved in sexual reproduction.

View solution

Compare **asexual** reproduction with **sexual** reproduction.

.....

.....

.....

.....

.....

.....

..... [3]

[Total: 10]

3 **(a)** Fig. 3.1 shows the number of deaths in one country that were due to excessive alcohol consumption.

View solution

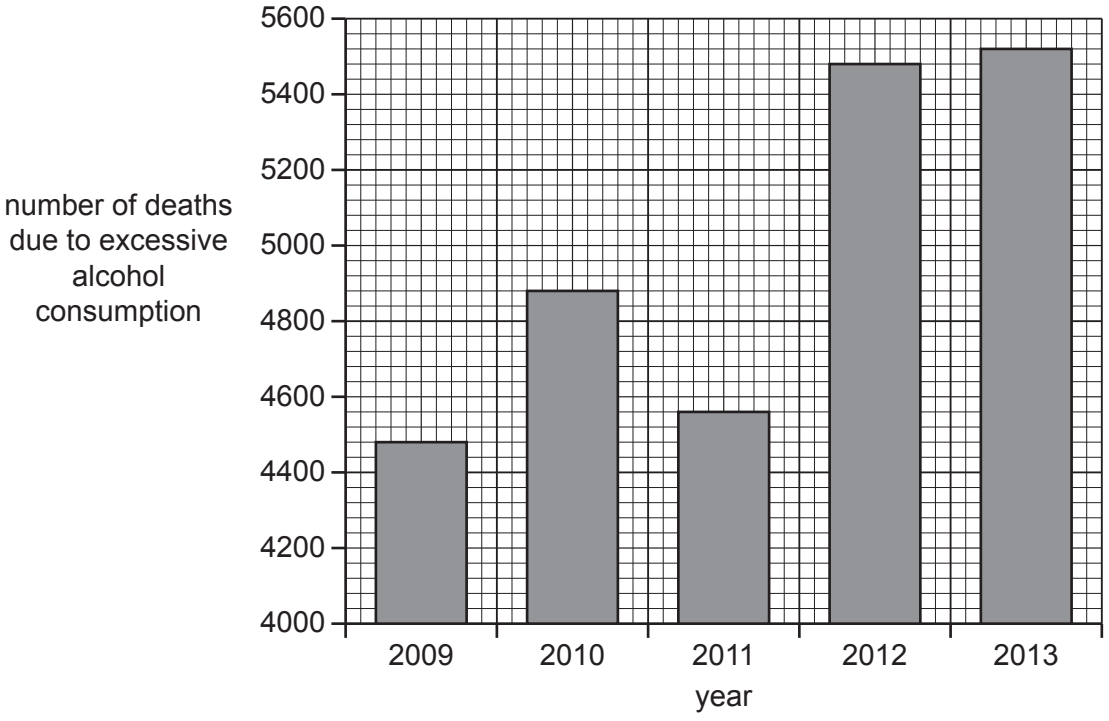

Fig. 3.1

Describe the results shown in Fig. 3.1.

Use the data to support your answer.

.....

.....

.....

.....

.....

.....

..... [3]

(b) Describe **two** short-term effects of excessive alcohol consumption on the nervous system.

1 .....

.....

2 .....

.....

[2]

(c) State the name of **one** organ damaged by long-term excessive alcohol consumption.

..... [1]

(d) Alcohol dehydrogenase is an enzyme that breaks down alcohol in the body.

View solution

Fig. 3.2 shows the activity of alcohol dehydrogenase at different pH values.

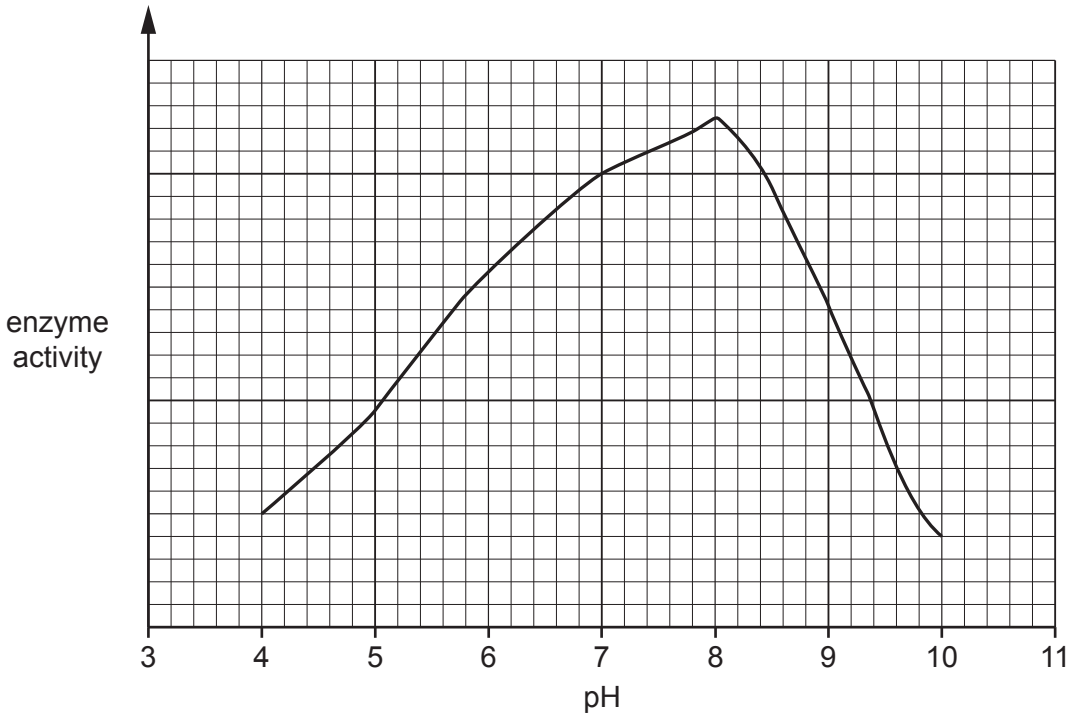

Fig. 3.2

(i) State the pH value with the highest enzyme activity in Fig. 3.2.

..... [1]

(ii) State the pH value with the lowest enzyme activity in Fig. 3.2.

..... [1]

(iii) Suggest **one other** factor that could affect the activity of the enzyme alcohol dehydrogenase.

..... [1]

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(e) Enzymes are biological catalysts.

View solution

Define the term catalyst.

.....

.....

..... [2]

(f) Enzymes are proteins.

View solution

(Circle) the elements that all enzymes contain.

calcium	**carbon**	**hydrogen**	**iodine**
iron	**magnesium**	**nitrogen**	**oxygen**

[2]

[Total: 13]

4 **(a)** The box on the left contains the words ‘Aerobic respiration’.

View solution

The boxes on the right show some sentence endings.

Draw lines to make **three** correct sentences about aerobic respiration.

Aerobic respiration	involves the action of enzymes.
	occurs in animals only.
	produces water.
	requires carbon dioxide.
	releases less energy than anaerobic respiration.
	requires oxygen.

[3]

(b) One effect of the release of the hormone adrenaline is to increase blood glucose concentration. This allows more aerobic respiration to occur.

(i) Place ticks (✓) in the correct boxes to show other effects of the release of adrenaline on the body.

View solution

change in the genotype	
decreased breathing rate	
development of lung cancer	
increased pulse rate	
widened pupils	

[2]

(ii) State the name of the gland that releases adrenaline.

..... [1]

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(iii) State how adrenaline is transported to its target organs.

.....

..... [1]

(c) State the names of **two** hormones involved in the development of secondary sexual characteristics in humans.

1 .....

2 .....

[2]

(d) State the name of the organ that secretes the hormone insulin.

View solution

..... [1]

(e) Organs, tissues and specialised cells are structures in the body that perform a particular function.

View solution

Write these parts of the body in order of size from smallest to largest.

cell **DNA molecule** **organ** **organ system** **tissue**

smallest .....

.....

.....

.....

largest .....

[2]

[Total: 12]

5 **(a)** Fig. 5.1 is a diagram of a human heart.

View solution

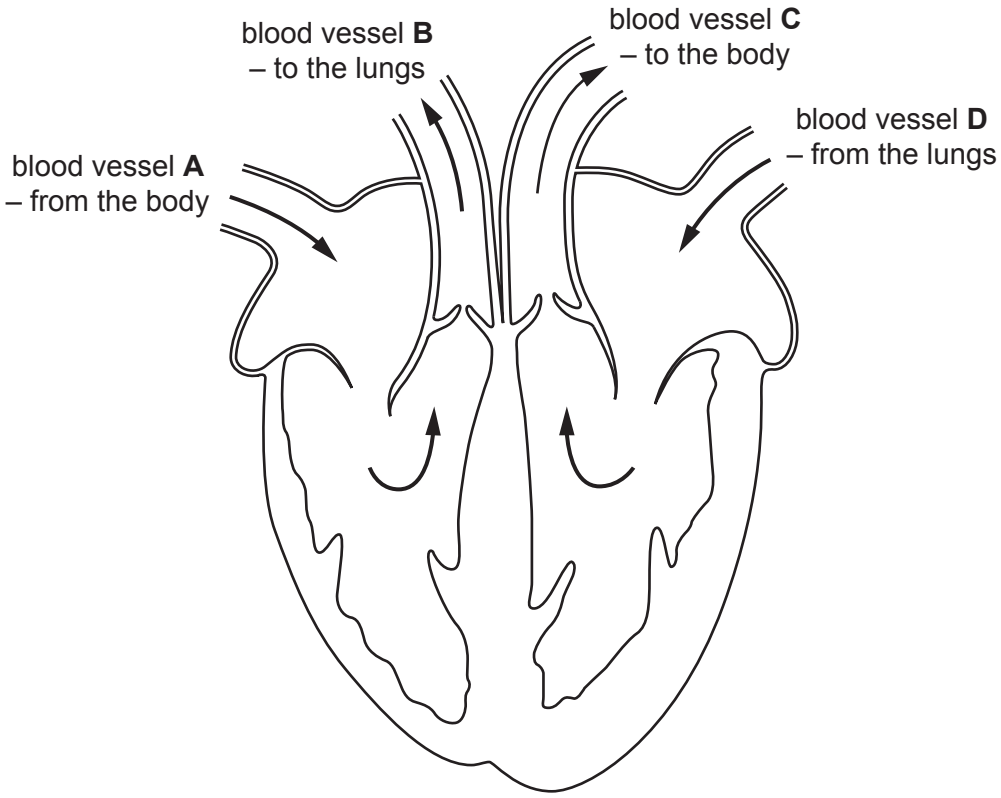

Fig. 5.1

(i) Use label lines and labels to identify these structures on Fig. 5.1:

- **atrium**
- **septum**
- **ventricle**
- **valve**

[4]

(ii) Identify the letter or letters of all the blood vessels from Fig. 5.1, that:

View solution

are arteries .....

is the pulmonary vein ..... .

[2]

(b) The activity of the heart can be monitored by measuring the pulse rate.

View solution

State **two other** ways of monitoring the activity of the heart.

1 .....

2 .....

[2]

(c) Coronary heart disease (CHD) is caused by a blockage of blood vessels in the heart.

View solution

(i) State the name of the blood vessels that become blocked.

..... [1]

(ii) State **three** risk factors for developing CHD.

View solution

1 .....

2 .....

3 .....

[3]

[Total: 12]

6 **(a)** Dimples are an indentation of the cheek visible when smiling.

View solution

Fig. 6.1 is a photograph showing a person with dimples.



Fig. 6.1

The number of male and female students in a class that had dimples was recorded.

The results are shown in Table 6.1.

Table 6.1

characteristic	sex	number of students
with dimples	male	4
	female	5
without dimples	male	13
	female	12

(i) Calculate the total number of male students in the class.

..... [1]

(ii) Calculate the difference in number between male and female students **with** dimples.

..... [1]

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(iii) Describe the evidence from Table 6.1 that shows that dimples are a type of discontinuous variation.

.....

.....

.....

.....

..... [2]

(iv) State **one other** example of discontinuous variation in humans.

..... [1]

(v) State **one** example of continuous variation in humans.

..... [1]

(b) Variation can be caused by a mutation.

View solution

Complete the sentences about mutation using words from the list.

Each word can be used once, more than once or not at all.

alleles **decrease** **genetic** **impulses**

increase **ionising** **maintain** **physical** **stimuli**

A mutation is a ..... change.

Mutations form new ..... .

Some chemicals and ..... radiation can

..... the rate of mutation.

[4]

[Total: 10]

7 **(a)** Modern technology has improved food production.

View solution

Table 7.1 shows some of the ways that food production has been improved.

Complete Table 7.1 by writing an example for each description.

Table 7.1

example of technology	description of how it has improved food production
	used to farm larger areas of land
	used to improve growth in plants by providing nutrients
	used to improve yield by removing animal pests
	used to remove competition by weeds

[4]

(b) Intensive livestock production is used to improve food production.

View solution

Describe the negative effects of intensive livestock production.

.....

.....

.....

.....

.....

.....

..... [3]

(c) Selective breeding can be used to improve the yield of meat from livestock.

Sentences **A** to **E** in Table 7.2 describe the selective breeding of chickens to improve meat quantity.

View solution

The sentences are **not** in the correct order.

Table 7.2

Breed the chickens together.	**A**
Observe the chickens to identify those that will yield the most meat.	**B**
Observe the offspring and select the offspring that will yield the most meat.	**C**
Repeat the process over many generations.	**D**
Select one male and one female chicken.	**E**

Put the letters from Table 7.2 into the correct order.

One has been done for you.

		A		

[2]

(d) Lack of food can affect the population size of animals in ecosystems.

View solution

State **two other** factors that could decrease population size.

1 .....

2 .....

[2]

[Total: 11]

8 **(a)** A student investigated the conditions needed for germination of seeds.

View solution

Fig. 8.1 shows the apparatus and conditions used.

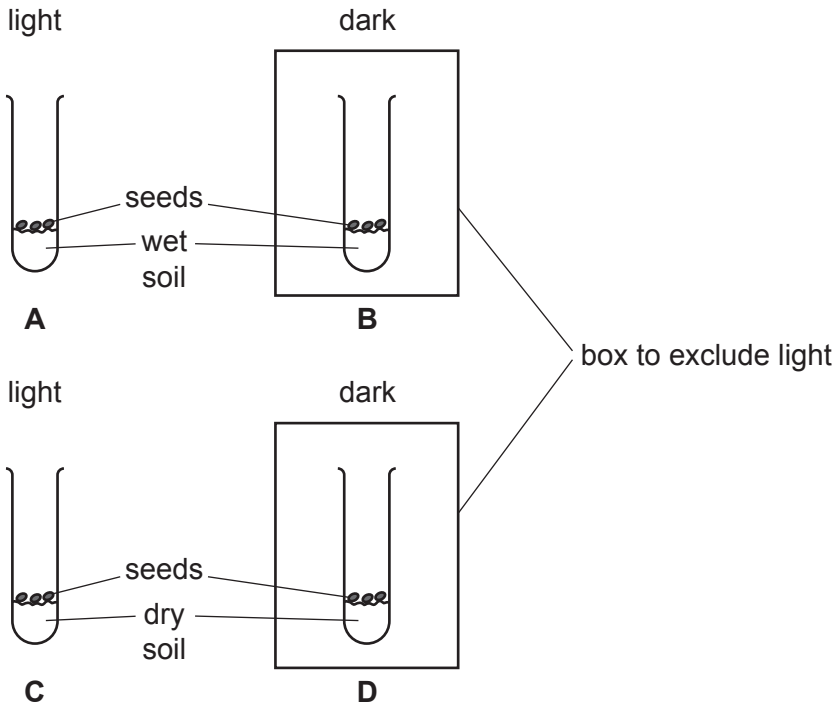

Fig. 8.1

The seeds in test-tubes **A** and **B** germinated but the seeds in test-tubes **C** and **D** did not germinate.

(i) Use the information in Fig. 8.1 to state **one** condition required for germination.

..... [1]

(ii) Use the information in Fig. 8.1 to state **one** condition **not** required for germination.

..... [1]

(iii) The investigation was repeated with seeds that had been boiled for 10 minutes and then cooled.

Predict **and** explain the effect of boiling on the results.

.....

.....

.....

.....

..... [2]

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(b) Photosynthesis and germination have different requirements.

View solution

(i) State the word equation for photosynthesis.

..... [2]

(ii) State the name of **one** condition needed for both photosynthesis and germination.

..... [1]

[Total: 7]

View solution

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